

What is claimed is:

1. Scanning optics comprising:

first optics for coupling a light beam issuing from a light source;

second optics for condensing the light beam output from said first optics substantially in a form of a line elongate in a main scanning direction;

a deflector including reflection faces, which adjoin a position where the light beam is condensed in the form of a line, for deflecting said light beam with said reflection faces; and

third optics for condensing the light beam deflected by said deflector toward a surface to be scanned to thereby form a beam spot on said surface for optically scanning said surface;

wherein said third optics includes at least one focusing element formed of resin;

said second optics includes at least one focusing element formed of resin and at least one focusing element formed of glass,

at least one surface of said second optics comprises a non-arcuate auxiliary surface non-arcuate in a section in a subscanning direction, and

among said focusing elements of said second optics, a focusing element through which the light beam output from

said first optics is transmitted with a maximum diameter in the subscanning direction comprises said at least one non-arcuate auxiliary surface.

2. The scanning optics as claimed in claim 1, wherein said third optics includes said at least one arcuate auxiliary surface.

3. The scanning optics as claimed in claim 1, wherein among said focusing elements of said second optics, a surface of the focusing element through which the light beam output from said first optics is transmitted with the maximum diameter in the subscanning direction comprises said at least one non-arcuate auxiliary surface.

4. The scanning optics as claimed in claim 3, wherein said second optics comprises two lenses formed of resin and a single lens formed of glass,

said two lenses formed of resin adjoin said first optics and have negative power in the subscanning direction,

said single lens formed of glass adjoins said deflector and has positive power in the subscanning direction, and

at least one of said two lenses formed of resin has power in the main scanning direction opposite to power of said focusing element of said third optics formed of resin in the main scanning direction.

5. The scanning optics as claimed in claim 4, wherein one of said two lenses formed of resin has a concave, spherical input surface and a concave, cylindrical output surface and adjoins said first optics,

the other of said two lenses comprises a cylindrical lens having negative power in the subscanning direction, and

said single lens formed of glass comprises a toroidal lens having positive power in the main and subscanning directions and is positioned closer to said deflector than said cylindrical lens and has a non-arcuate auxiliary input surface.

6. The scanning optics as claimed in claim 5, wherein said third optics includes said at least one non-arcuate auxiliary surface.

7. The scanning optics as claimed in claim 1, wherein said second optics comprises two lenses formed of resin and a single lens formed of glass,

said two lenses formed of resin adjoin said first optics and have negative power in the subscanning direction,

said single lens formed of glass adjoins said deflector and has positive power in the subscanning direction, and

at least one of said two lenses formed of resin has

power in the main scanning direction opposite to power of said focusing element of said third optics formed of resin in the main scanning direction.

8. The scanning optics as claimed in claim 7, wherein one of said two lenses formed of resin has a concave, spherical input surface and a concave, cylindrical output surface and adjoins said first optics,

the other of said two lenses comprises a cylindrical lens having negative power in the subscanning direction, and

said single lens formed of glass comprises a toroidal lens having positive power in the main and subscanning directions and is positioned closer to said deflector than said cylindrical lens and has a non-arcuate auxiliary input surface.

9. The scanning optics as claimed in claim 8, wherein said third optics includes said at least one non-arcuate auxiliary surface.

10. Scanning optics comprising:

first optics for coupling a light beam issuing from a light source;

second optics for condensing the light beam output from said first optics substantially in a form of a line elongate in a main scanning direction;

a deflector including reflection faces, which

adjoin a position where the light beam is condensed in the form of a line, for deflecting said light beam with said reflection faces; and

third optics for condensing the light beam deflected by said deflector toward a surface to be scanned to thereby form a beam spot on said surface for optically scanning said surface;

wherein said third optics includes at least one focusing element formed of resin;

said second optics includes at least one focusing element formed of resin and at least one focusing element formed of glass,

at least one surface of said second optics comprises a non-arcuate auxiliary surface non-arcuate in a section in a subscanning direction, and

among said focusing elements of said second optics, a focusing element formed of resin through which the light beam output from said first optics is transmitted with a maximum diameter in the subscanning direction comprises said at least one non-arcuate auxiliary surface.

11. The scanning optics as claimed in claim 10, wherein said third optics includes said at least one non-arcuate auxiliary surface.

12. The scanning optics as claimed in claim 10, wherein among said focusing elements of said second optics,

a surface of the focusing element through which the light beam output from said first optics is transmitted with the maximum diameter in the subscanning direction comprises said at least one non-arcuate auxiliary surface.

13. The scanning optics as claimed in claim 10, wherein said second optics comprises two lenses formed of resin and a single lens formed of glass,

said two lenses formed of resin adjoin said first optics and have negative power in the subscanning direction,

said single lens formed of glass adjoins said deflector and has positive power in the subscanning direction, and

at least one of said two lenses formed of resin has power in the main scanning direction opposite to power of said focusing element of said third optics formed of resin in the main scanning direction.

14. The scanning optics as claimed in claim 13, wherein one of said two lenses formed of resin has a concave, spherical input surface and a concave, cylindrical output surface and adjoins said first optics,

the other of said two lenses comprises a cylindrical lens having negative power in the subscanning direction and having a non-arcuate auxiliary output surface, and

said single lens formed of glass comprises a toroidal

lens having positive power in the main and subscanning directions and is positioned closer to said deflector than said cylindrical lens.

15. The scanning optics as claimed in claim 14, wherein among said focusing elements of said second optics, a surface of the focusing element through which the light beam output from said first optics is transmitted with the maximum diameter in the subscanning direction comprises said at least one non-arcuate auxiliary surface.

16. The scanning optics as claimed in claim 10, wherein said second optics comprises two lenses formed of resin and a single lens formed of glass,

said two lenses formed of resin adjoin said first optics and have negative power in the subscanning direction,

said single lens formed of glass adjoins said deflector and has positive power in the subscanning direction, and

at least one of said two lenses formed of resin has power in the main scanning direction opposite to power of said focusing element of said third optics formed of resin in the main scanning direction.

17. The scanning optics as claimed in claim 16, wherein one of said two lenses formed of resin has a concave, spherical input surface and a concave, cylindrical output

surface and adjoins said first optics,

the other of said two lenses comprises a cylindrical lens having negative power in the subscanning direction and having a non-arcuate auxiliary output surface, and

said single lens formed of glass comprises a toroidal lens having positive power in the main and subscanning directions and is positioned closer to said deflector than said cylindrical lens.

18. The scanning optics as claimed in claim 17, wherein said third optics includes said at least one non-arcuate auxiliary surface.

19. In an optical scanning device including scanning optics that couples a light beam issuing from a light source with first optics, condenses a coupled light beam with second optics substantially in a form of a line elongate in a main scanning direction, deflects a condensed light beam with a deflector including reflection faces, which adjoin a position where said light beam is condensed in the form of a line, and then condenses a deflected light beam toward a surface to be scanned with third optics to thereby form a beam spot on said surface for thereby optically scanning said surface, said third optics includes at least one focusing element formed of resin, said second optics includes at least one focusing element formed of resin and at least one focusing element



formed of glass,

at least one surface of said second optics comprises a non-arcuate auxiliary surface non-arcuate in a section in a subscanning direction, and

among said focusing elements of said second optics, a focusing element through which the light source output from said first optics is transmitted with a maximum diameter in the subscanning direction comprises said at least one non-arcuate auxiliary surface.

20. In an optical scanning device including scanning optics that couples a light beam issuing from a light source with first optics, condenses a coupled light beam with second optics substantially in a form of a line elongate in a main scanning direction, deflects a condensed light beam with a deflector including reflection faces, which adjoin a position where said light beam is condensed in the form of a line, and then condenses a deflected light beam toward a surface to be scanned with third optics to thereby form a beam spot on said surface for thereby optically scanning said surface, said third optics includes at least one focusing element formed of resin,

said second optics includes at least one focusing element formed of resin and at least one focusing element formed of glass,

at least one surface of said second optics comprises

a non-arcuate auxiliary surface non-arcuate in a section in a subscanning direction, and

among said focusing elements of said second optics, a focusing element formed of resin through which the light beam output from said first optics is transmitted with a maximum diameter in the subscanning direction comprises said at least one non-arcuate auxiliary surface.

21. In an image forming apparatus including an optical scanning device for scanning an image carrier, said optical scanning device comprising scanning optics that couples a light beam issuing from a light source with first optics, condenses a coupled light beam with second optics substantially in a form of a line elongate in a main scanning direction, deflects a condensed light beam with a deflector including reflection faces, which adjoin a position where said light beam is condensed in the form of a line, and then condenses a deflected light beam toward a surface of said image carrier with third optics to thereby form a beam spot on said surface for thereby optically scanning said surface, said third optics includes at least one focusing element formed of resin,

said second optics includes at least one focusing element formed of resin and at least one focusing element formed of glass,

at least one surface of said second optics comprises

a non-arcuate auxiliary surface non-arcuate in a section in a subscanning direction, and

among said focusing elements of said second optics, a focusing element through which the light beam output from said first optics is transmitted with a maximum diameter in the subscanning direction comprises said at least one non-arcuate auxiliary surface.

22. The apparatus as claimed in claim 21, wherein said image carrier comprises a photoconductive element, and said optical scanning device forms a latent image on said photoconductive element.

23. In an image forming apparatus including an optical scanning device for scanning an image carrier, said optical scanning device comprising scanning optics that couples a light beam issuing from a light source with first optics, condenses a coupled light beam with second optics substantially in a form of a line elongate in a main scanning direction, deflects a condensed light beam with a deflector including reflection faces, which adjoin a position where said light beam is condensed in the form of a line, and then condenses a deflected light beam toward a surface of said image carrier with third optics to thereby form a beam spot on said surface for thereby optically scanning said surface, said third optics includes at least one focusing element formed of resin;

said second optics includes at least one focusing element formed of resin and at least one focusing element formed of glass,

at least one surface of said second optics comprises a non-arcuate auxiliary surface non-arcuate in a section in a subscanning direction, and

among said focusing elements of said second optics, a focusing element formed of resin through which the light beam output from said first optics is transmitted with a maximum diameter in the subscanning direction comprises said at least one non-arcuate auxiliary surface.

24. The apparatus as claimed in claim 23, wherein said image carrier comprises a photoconductive element, and said optical scanning device forms a latent image on said photoconductive element.